DESCRIPTION OF *RETUSA PELYX* BURN SP. NOV. (OPISTHOBRANCHIA) AND ITS FOOD RESOURCES FROM SWAN BAY, VICTORIA

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SUMMARY

Retusa pelyx Burn sp. nov. is described from Swan Bay, Victoria, and compared with other species from south-eastern Australia. Gizzard contents indicate highly selective food preferences for certain species of Foraminifera.

INTRODUCTION

Following an earlier study on *Retusa chrysoma* Burn (1974) from Corner Inlet, Victoria (Burn and Bell, 1974), we have investigated a population of a new species of *Retusa, R. pelyx,* at Swan Bay, Victoria. As before, the description of the new species has been prepared by the first author (R.B.), and the analysis of the food resources by the second author (K.N.B.).

The type series and all other material of *Retusa pelyx,* and a series of the foraminiferans from the gizzard contents, mounted on slides, have been presented to the National Museum of Victoria, Melbourne. The first author (R.B.) expresses his gratitude to the Science and Industry Endowment Fund, C.S.I.R.O., Canberra, for continued support of this and other research on the Australian opisthobranch molluscs.

SYSTEMATIC DESCRIPTION

Retusa pelyx Burn sp. nov.

Text figures 1-6

Description. Shell (Figs. 1-3) small, cylindrical, anteriorly rounded, posteriorly obliquely truncate. Colour cream or creamy-yellow, thin periostracum when present shining brown. Sculpture of growth lines only, stronger posteriorly and curved in on the vertex. Aperture anteriorly pyriform, medially narrow and constricted, posteriorly rising above the last whorl, except in gerontic specimens (Fig. 2), and inclined towards the axis. Some adult shells have the anterior and posterior parts of the aperture in different planes, in which case the aperture appears to be medially wholly constricted (Fig. 3, and a specimen from Shallow Inlet). Columella with an oblique plait in large specimens, straight in juveniles. Spire deeply sunk, the summits of previous whorls visible, sculptured by oblique threads descending to a papillary protoconch, 0.24 mm in diameter and of the open type as in *R. obtusa* (Lemche, 1948: 19, fig. 15). Dimensions (length x breadth): Holotype 4.475 x 1.82 mm, figured paratypes 4.84 x 2.3 and 2.0 x 1.1 mm, figured specimen 4.86 x 2.1 mm.

Animal (Fig. 6) yellowish-cream or translucent, with or without clusters of cream flecks; head quadrate, broad, with a pair of broad thin lobes posteriorly; pale brown Hancock's organs large and well developed, with 7-9 transverse (i.e. vertical) furrows separating low rounded cushions; foot short, rounded anteriorly, truncate posteriorly, without operculum. Gastral plates (Fig. 4) with many dark tubercles, mostly small, with a few larger and higher tubercles posteriorly; plates concave on the face in small specimens, convex in larger specimens. Male copulatory organ (Fig. 5) lies beside the gizzard; atrium (a) long, with seminal groove (s) protected by a thin flap extending almost to penial sheath; stout penial papilla (pp) projects from short sheath into atrium; prostate gland (pg) winding, filled with shining cells; retractor muscles (m) attached to both atrium and prostate gland.

Material examined. From *Zostera*, shingle and mud flats at S. end of Swan Bay, 50-100 m NE. of sewage pumping station on low side of high school, Queenscliff, Victoria, collected by R. Burn, 13 & 15 April 1973, 17 specimens (NMV. F27915), and 7 July 1973, 28 specimens (Holotype NMV. F27911 and 27 paratypes NMV. F27912). From fine sand surrounding temporary algal mats at low tide level, in protected area on S. side of wall of fishermen's boat channel connecting Swan Bay with Port Phillip Bay, Queenscliff, Victoria, collected by R. Burn, 10 November 1973, 4 specimens (NMV. F27913). From fine sand and shingle between sand bar and beach at small boat haven, Portarlington, Victoria, collected by R. Burn, 8 December 1973, 1 specimen (NMV. F27914). From *Zostera* and mud flats at Winchester's, Shallow Inlet, Victoria, collected by K. N. Bell, 11 April 1971, 16 specimens (NMV. F27916).

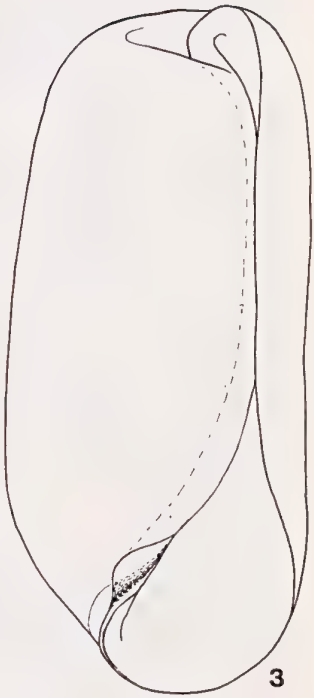
Ecology. The specimens were collected by sieving the top 1 cm of the substrate at mid to low tide levels. Other opisthobranchs inhabiting the same biotope at Swan Bay were *Tornatina* cf. *apicina* (Gould, 1859) (Scaphandridae), *Haminoea maugeansis* Burn (1966) and *Liloa brevis* (Quoy and Gaimard, 1833) (Atysidae), and *Retusa* sp. nov. (Retusidae). The first three species were also present at Queenscliff and Shallow Inlet.

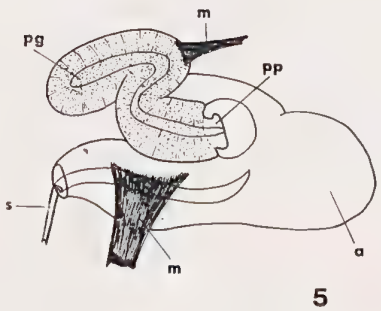
At Queenscliff, *R. pelyx* forms part of the diet of the predatory species, *Aglaja taronga* Allan, 1933. A specimen of the latter, collected (by R.B.) on 6 October 1973, re-gurgitated three large *R. pelyx*, one small *Haminoea maugeansis*, and one small *Assiminea brazieri* Tenison Woods (1876).

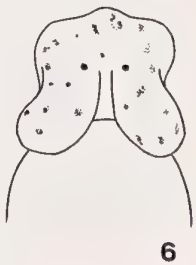
From late winter (August) through summer to late autumn (May), specimens of all sizes are widely distributed throughout the type locality, from just below high tide level to the subtidal off-shore channel. In late June, only fully adult specimens have been found, and these only in the area just below high tide level. Egg masses associated with the adults comprise a single strand of evenly spaced ovoid capsules, 250-280 μm in diameter, linked together by a thread. The strand is twisted into a loose ball, 3-5 μm in diameter, and wrapped in mucous. An average of 50 capsules is present in each mass. Each capsule contains a single white ovum, 160-180 μm in diameter.

Similar egg masses were observed with adult *R. pelyx* at Queenscliff in early November, indicating a lengthy breeding season for the species.

Etymology. From the Gk. *pelyx* = a bowl or basin.







TEXT FIGURES 1-6 *Retusa pelyx* Burn sp. nov.

1: Holotype. 2: Largest and smallest paratypes. 3: Large shell from Queenscliff channel. 4: Gastral plates. 5: Male copulatory organ. 6: Head of crawling animal.

a — atrium, m — retractor muscle, pg — prostate gland, pp — penial papilla, s — seminal groove.

Discussion. The recently described *R. chrysoma* Burn (1974: 115) from Corner Inlet, Victoria, which upon examination of living material and the preserved paratypes reveals itself to sometimes possess a small thin crimson operculum, differs not only by this characteristic from *R. pelyx*, but also in the fewer but larger tubercles on the gastral plates, the presence of both seminal vesicle and prostate gland in the male copulatory organ, a greater number of folds in the Hancock's organs, and the presence of spiral sculpture on the shell.

R. atkinsoni (Tenison Woods, 1875), live taken in Victorian waters, is separated by its elongate tapering shell and smooth Hancock's organs from *R. pelyx*. Both *R. pygmaea* (A. Adams, 1854) from South Australia and *R. iredaleana* Hedley (1914) from New South Wales are separated by much broader shells from *R. pelyx*.

There is another species like *R. chrysoma* in which an operculum is sometimes present. Among five specimens of *R. truncatula* (Bruguière, 1789) received from Dr H. Lemche (SE. of Vrö 3-5 m, Isefiord, Zealand, Denmark, 23 August 1960, collected and identified by H. Lemche), there are two specimens with a small thick dark brown operculum. The other three specimens have no trace whatsoever of opercula. Probably the operculum is poorly attached to the animal, which, upon abrupt contraction when placed into preservative, more often that not causes the operculum to drop off.

Besides *R. chrysoma* and *R. truncatula*, there are two other operculate *Retusa* species. *R. operculata* Minichev (1966: 509) from 5210 m in the far northern Pacific has spiral sculpture and both seminal vesicle and prostate gland, the latter bipartite (Minichev, 1967: 128, fig. 24B). *R. succinta* (A. Adams, 1862) from the Japan Sea (Minichev, 1971: 233) has large tubercles at the second third of the gastral plates and a stout shell.

Feeding observations. A small transparent topotypical specimen of *R. pelyx*, shell dimensions 1.75 x 0.92 mm, was maintained alive (by R.B.) in a petrie dish for seven days in a starved condition. When presented with a large living specimen of the epifaunal foraminiferan, *Discorbis dimidiatus*, from the same locality, it ingested the latter in the space of four minutes. By contracting the head rearwards, the mouth was able to dilate, particularly in the vertical plane, and engulf the foraminiferan. A series of severe contractions of the whole head and alimentary tract forced the foraminiferan rearwards until it lodged against the posterior wall of the gizzard between the gastral plates. The latter immediately activated and with regular movements began to move to and fro, firstly in an anterior direction away from the oesophageal aperture in the posterior wall of the gizzard, then in a posterior direction towards the oesophageal aperture, always closely adpressed to the test of the foraminiferan.

Hurst (1965: 326) observed *R. truncatula* (Bruguière, 1789) feeding on foraminiferans and remarked upon the dilation of the mouth. In that species sand grains were also sucked into the mouth along with the foraminiferans. This contrasts to *R. pelyx* where muscular action of the alimentary tract moves the food into the gizzard and where sand grains have not been observed.

GIZZARD CONTENTS

Methods of collection and analysis of specimens were the same as that given in Burn and Bell (1974). Detailed references to all the identified

Foraminifera can be found in Collins (1974) and Burn and Bell (1974). The gizzard contents of 12 specimens of *R. pelyx* consisted of 88 specimens of Foraminifera belonging to six species (Table 1). Table 2 shows the contents of each specmen of *R. pelyx*. It should be noted that two specimens contained no food of any kind. From the sediment sample, 23 species of living Foraminifera were recovered (Table 3).

The tables show that *R. pelyx* is highly selective in its food intake *Ammonia aoteanus* is the most prominent food resource constituting 48.9% of the gizzard contents but only 3.7% of the foraminiferal fauna of the sediment. *Elphidium selseyense* seems also to be selected as food as it is twice as frequent in the gizzard as in the sediment. The higher percentage of *Bulimina gibba* may not be significant as it was only found in one specimen whereas the other foraminiferans were present in many to several specimens of *R. pelyx*. Selective feeding is also shown by the much lower percentage of *Quinquiloculina seminula* in the gizzard, relative to that of the sediment where it is highly dominant.

All foraminiferans showed sollution effects. Some specimens were corroded to such an extent that specific identification was not possible, these have been recorded as species indeterminate in Table I. This solution of the gizzard contents is in accord with the observations on *R. chrysoma* (Burn and Bell, 1974).

R. pelyx shows interesting and major differences to those recorded for *R. chrysoma*. *R. pelyx* is far more selective in its foraminiferal food from the sediment. The major food of *R. pelyx* is 15 times as common in the gizzard as in the sediment compared with *R. chrysoma* which showed an increase by a factor of only four. It is also, as far as this study shows, only predatory on Forminifera unlike *R. chrysoma* in which the gastropod *Salinator fragilis* formed about one-third of the food. There was no evidence of any other food sources in the gizzard contents of *R. pelyx*.

The highly variable number of foraminifera in the gizzard leads to speculation as to how these opisthobranchs actually feed. Does the animal engorge itself until the gizzard is filled and then slowly assimilate all the food, and then re-feed, or, does it ingest food continuously.

Discorbis dimidiatus (Parker and Jones, 1862), the foraminiferan fed to the starved *R. pelyx*, is an epifaunal species not uncommonly found alive on shingle and algae at Swan Bay. Under normal conditions, the infaunal *R. pelyx* does not encounter this species alive among the living infaunal Foraminifera, though it is present as dead specimens in the sediment.

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TABLE 1

Foraminifera in the gizzard of **R. pelyx.**

Foraminiferan	No. of Specimens	%	% in sediment sample
Ammonia aoteanus	43	48.9	3.7
Quinquiloculina seminula	17	19.3	42.5
Elphidium selseyense	13	14.7	7.0
Bulimina gibba	7	7.9	4.8
Quinquiloculina poeyana	4	4.5	7.8
E. simplex	1	1.1	0.4
Indeterminate	3	3.4	—

TABLE 3

Frequency of Live Foraminifera in Sediment.

Quinquiloculina seminula	42.5%
Q. poeyana	7.8%
Elphidium advenum	7.4%
E. selseyense	7.0%
Quinquiloculina sp.a	6.3%
Bulimina gibba	4.8%
Ammonia aoteanus	3.7%
Cyclogyra planorbis	3.0%
Elphidium earlandi avalonense	2.5%
Tretomphalus planus	2.5%
Miliolinella labiosa	1.8%
Textularia porrecta	1.8%
Elphidium sp.a	1.5%
Quinquiloculina lamarckiana	1.1%
Brizalina compacta	1.1%
Sigmoilopsis australis	0.7%
Bulimina marginata	0.7%
Brizalina cacozela	0.7%
Spirillina runiana	0.7%
Elphidium simplex	0.7%
Ammobaculites australiensis	0.7%
Quinquiloculina sp.b	0.7%

TABLE 2

Number of Foraminifera in **R. pelyx.**

	Specimens										
Gizzard contents	a	b	c	d	e	f	g	h	j	k	Total
A. aoteanus	4	2	3	5	4	7	5	5	4	4	43
Q. seminula	7			1	2	4			2	1	17
E. selseyense	2			2		2		4	3		13
B. gibba								7			7
Q. poeyana						2		2			4
E. simplex									1		1
Indet.				1					2		3
Total	13	2	3	9	6	15	5	18	12	5	